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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

WEBB, GREGORY E

ART UNIT

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1796

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/525,249	ITANO ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Gregory E. Webb	1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-73 is/are pending in the application.
- 4a) Of the above claim(s) 15-34 and 67-73 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1-14 and 35-66 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. ____.                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>0808:0406:0205</u> .  | 6) <input type="checkbox"/> Other: ____.                          |

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments filed 7/16/08 have been fully considered.
2. The applicant argues that the composition of group I and the method of removing etching residue of group IX should not be restricted because they share a common technical feature.
3. As claim 67 does not require additional components beyond those described in claim 1 the examiner agrees with those arguments.
4. As such claim 1-14, 35-66 as well as claim 67 will be examined together.

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-14, 35-66 are rejected under 35 U.S.C. 102(e) as being anticipated by Kezuka et al (US 7,052,627).

Concerning the preferred fluorinated alcohols, preferred polyols, preferred ethers, preferred aldehydes, preferred glycol ethers, preferred solvent types, and preferred nitriles, Kezuka, Takehiko teaches the following:

Examples of the organic solvent having a hetero atom include **methanol** (relative dielectric constant: 32.6 (25.degree. C.)), **ethanol** (relative dielectric constant: 24.6 (25.degree. C.)), **isopropyl alcohol** (IPA, relative dielectric constant: 19.9 (25.degree. C.)), **1-propanol** (relative dielectric constant: 22.2 (25.degree. C.)), **1-butanol** (relative dielectric constant: 17.1 (25.degree. C.)), **2-butanol** (relative dielectric constant: 15.5 (19.degree. C.)), **t-butanol** (relative dielectric constant: 11.4 (19.degree. C.)), **2-methyl-1-propanol** (relative dielectric constant: 17.95 (20.degree. C.)), **1-pentanol** (relative dielectric constant: 13.9 (25.degree. C.)), **1-hexanol** (relative dielectric constant: 13.3 (25.degree. C.)), **1-heptanol**, **4-heptanol**, **1-octanol** (relative dielectric constant: 10.34 (20.degree. C.)), 1-nonyl alcohol, **1-decanol**, **1-dodecanol** and like alcohols; **ethylene glycol** (relative dielectric constant: 37.7 (25.degree. C.)), **1,2-propanediol** (relative dielectric constant: 32.0 (20.degree. C.)), **2,3-butanediol**, **glycerin** (relative dielectric constant: 42.5 (25.degree. C.)) and like **polyols**, **acetone** (relative dielectric constant: 20.7 (25.degree. C.)), **acetylacetone**, **methyl ethyl ketone** (relative dielectric constant: 18.51 (20.degree. C.)) and like **ketones**; **acetonitrile** (relative dielectric constant: 37.5 (20.degree. C.)), **propionitrile** (relative dielectric constant: 29.7 (20.degree. C.)), **butyronitrile** (relative dielectric constant: 20.3 (20.degree. C.)), **isobutyronitrile**

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(relative dielectric constant: 20.4 (20.degree. C.)), **benzonitrile** (relative dielectric constant: 25.2 (25.degree. C.)) and like **nitriles**; **formaldehyde**, **acetaldehyde**, **propionaldehyde** and like **aldehydes**; **ethylene glycol** monomethyl ether, **ethylene glycol monoethyl ether** and like **alkylene glycol monoalkyl ethers**; **tetrahydrofuran** (relative dielectric constant: 7.6 (25.degree. C.)), **dioxane** (relative dielectric constant: 2.2 (25.degree. C.)) and like **ethers**, **trifluoroethanol**, **pentafluoropropanol**, **2,2,3,3-tetrafluoropropanol** and like fluorine alcohols, **sulfolane** (relative dielectric constant: 43.3 (30.degree. C.)), **nitromethane** (relative dielectric constant: 35.87 (30.degree. C.)) and the like.

Concerning the preferred ketones, Kezuka, Takehiko teaches the following:

7. The etching solution according to claim 1 comprising ammonium **hydrogen fluoride**, water and **acetone**, the water being contained in a concentration of 3% by weight or lower.

Concerning the preferred hydrocarbons, preferred monocarboxylic acid, preferred sulfonic acid, preferred polycarboxylic acid, and hydrogen fluoride, Kezuka, Takehiko teaches the following:

Claims What is claimed is: 1. An etching solution having a thermal oxide (THOX) film etch rate and boron phosphosilicate glass (BPSG) film etch rate at 25.degree. C. of 100

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.ANG./min or lower and a ratio of (BPSG etch rate)/(THOX etch rate) of 1.5 or lower, wherein the solution comprises (i) at least one member selected from the group consisting of a fluoride salt and a **hydrogen fluoride** salt; and (ii) (a) solvent being at least one member selected from organic solvents and organic acids, or (b) solvent being at least one member selected from organic solvents and organic acids, and optionally water, said solvent comprising molecules having a hetero atom, and wherein said organic acids are selected from the group consisting of **acetic acid, propionic acid, butyric acid, isobutyric acid, valeric acid, caproic acid, caprylic acid, monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monofluoroacetic acid, difluoroacetic acid, trifluoroacetic acid, a-chlorobutyric acid, .beta.-chlorobutyric acid, .gamma.-chlorobutyric acid, lactic acid, glycolic acid, pyruvic acid, glyoxalic acid, acrylic acid**, and like monocarboxylic acids **methanesulfonic acid** and **toluenesulfonic acid**.

Concerning the preferred monohydric alcohols, Kezuka, Takehiko teaches the following:

6. The etching solution according to claim 1 comprising ammonium **hydrogen fluoride**, water and **ethanol**, the water being contained in a concentration of 3% by weight or lower.

7. Claims 1-14, 35-66 are rejected under 35 U.S.C. 102(b) as being anticipated by Suzuki et al (US 6,642,352).

Concerning the preferred hydrocarbons, and preferred ethers, Suzuki, Hidenori teaches the following:

The following solvents are given as examples of the organic solvent used in the present invention: aliphatic hydrocarbon solvents such as n-pentane, i-pentane, n-**hexane**, i-**hexane**, n-heptane, i-heptane, 2,2,4-trimethylpentane, n-**octane**, i-**octane**, **cyclohexane**, and methylcyclohexane; aromatic hydrocarbon solvents such as **benzene**, **toluene**, xylene, ethylbenzene, trimethylbenzene, methylethylbenzene, n-propylebenzene, i-propylebenzene, and diethylbenzene; **monohydric alcohols** such as **methanol**, **ethanol**, n-propanol, i-propanol, n-butanol, i-butanol, sec-butanol, **t-butanol**, n-pentanol, i-pentanol, 2-methylbutanol, sec-pentanol, t-pentanol, 3-methoxybutanol, n-hexanol, 2-methylpentanol, sec-hexanol, 2-ethylbutanol, sec-heptanol, heptanol-3, n-octanol, 2-ethylhexanol, sec-octanol, n-nonyl alcohol, 2,6-dimethylheptanol-4, n-decanol, sec-undecyl alcohol, trimethylnonyl alcohol, sec-tetradecyl alcohol, sec-heptadecyl alcohol, phenol, **cyclohexanol**, methyl**cyclohexanol**, 3,3,5-trimethyl**cyclohexanol**, benzyl alcohol, phenylmethylcarbinol, **diacetone** alcohol, and cresol; polyhydric alcohols such as **ethylene glycol**, 1,2-poly**ethylene glycol**, 1,3-butylene glycol, pentanediol-2,4, 2-methylpentanediol-2,4, **hexanediol**-2,5, heptanediol-2,4, 2-ethyl**hexanediol**-1,3, **diethylene glycol**, **dipropylene glycol**, **triethylene glycol**, **tripropylene glycol**, and glycerol; **ketones** such as **acetone**, **methyl ethyl ketone**, methyl n-propyl ketone, methyl n-butyl ketone, **diethyl ketone**, methyl i-butyl ketone,

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methyl n-pentyl ketone, ethyl n-butyl ketone, methyl n-hexyl ketone, di-i-butyl ketone, trimethylenonane, **cyclohexanone**, methyl **cyclohexanone**, 2,4-pentane dione, acetyl **acetone**, **diacetone** alcohol, acetophenone, and fenchone; **ethers** such as ethyl ether, i-propyl ether, n-butyl ether, n-hexyl ether, 2-ethylhexyl ether, ethylene oxide, 1,2-propylene oxide, dioxolane, 4-methyl dioxolane, **dioxane**, dimethyl **dioxane**, **ethylene glycol monomethyl ether**, **ethylene glycol monoethyl ether**, **ethylene glycol** diethyl ether, **ethylene glycol** mono-n-butyl ether, **ethylene glycol** mono-n-hexyl ether, **ethylene glycol** monophenyl ether, **ethylene glycol** mono-2-ethylbutyl ether, **ethylene glycol dibutyl ether**, diethylene glycol monomethyl ether, diethylene glycol monoethyl ether, diethylene glycol diethyl ether, diethylene glycol mono-n-butyl ether, diethylene glycol di-n-butyl ether, diethylene glycol mono-n-hexyl ether, ethoxy triglycol, tetraethylene glycol di-n-butyl ether, propylene glycol monomethyl ether, propylene glycol monoethyl ether, propylene glycol monopropyl ether, propylene glycol monobutyl ether, dipropylene glycol monomethyl ether, dipropylene glycol monoethyl ether, tripropylene glycol monomethyl ether, tetrahydrofuran, and 2-methyltetrahydrofuran; ester solvents such as diethyl carbonate, methyl acetate, ethyl acetate, gamma-butyrolactone, gamma-valerolactone, N-propyl acetate, i-propyl acetate, n-butyl acetate, i-butyl acetate, sec-butyl acetate, n-pentyl acetate, sec-pentyl acetate, 3-methoxybutyl acetate, methylpentyl acetate, 2-ethylbutyl acetate, 2-ethylhexyl acetate, benzyl acetate, cyclohexyl acetate, methylcyclohexyl acetate, n-nonyl acetate, methyl acetoacetate, ethyl acetoacetate, **ethylene glycol monomethyl ether** acetate, **ethylene glycol**



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monoethyl ether acetate, **diethylene glycol monomethyl ether** acetate, **diethylene glycol monoethyl ether** acetate, **diethylene glycol** mono-n-butyl ether acetate, **propylene glycol** monomethyl ether acetate, **propylene glycol** monoethyl ether acetate, **propylene glycol** monopropyl ether acetate, **propylene glycol** monobutyl ether acetate, **dipropylene glycol** monomethyl ether acetate, **dipropylene glycol** monoethyl ether acetate, glycol diacetate, methoxy triglycol acetate, **ethyl propionate**, n-butylpropionate, i-amyl propionate, **diethyl oxalate**, di-n-butyl oxalate, methyl lactate, ethyl lactate, n-butyl lactate, n-amyl lactate, diethyl malonate, **dimethyl phthalate**, and **diethyl phthalate**; nitrogen-containing solvents such as **N-methylformamide**, **N,N-dimethylformamide**, **N,N-dimethylformamide**, acetamide, **N-methylacetamide**, **N,N-dimethylacetamide**, N-methylpropionamide, and **N-methylpyrrolidone**; and sulfur-containing solvents such as diethyl sulfide, thiophene, tetrahydrothiophene, dimethylsulfoxide, sulfolane, and 1,3-propanesultone; These solvents may be used either individually or in combination of two or more.

Concerning the preferred esters, preferred polyols, preferred ketones, preferred amides, preferred nitrogen compounds, preferred glycol ethers, preferred monohydric alcohols, and preferred solvent types, Suzuki, Hidenori teaches the following:

In the present invention, it is particularly preferable to use an organic solvent having a boiling point lower than 250.degree. C. Specific examples are alcohols such as **methanol**, **ethanol**, and iso-propanol; polyhydric alcohols such as ethylene glycol and

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glycerol; glycol ether solvents such as **ethylene glycol monomethyl ether**, **ethylene glycol** monobutyl ether, **diethylene glycol monoethyl ether**, **diethylene glycol** diethyl ether, **propylene glycol** monopropyl ether, and **dipropylene glycol** monoethyl ether; glycol acetate solvents such as **ethylene glycol monomethyl acetate**, **diethylene glycol** monobutyl ether acetate, **ethylene glycol** diacetate, **propylene glycol** methylether acetate; amide solvents such as **N,N-dimethylacetamide**, **N,N-dimethylformamide**, and **N-methyl-2-pyrrolidone**; ketone solvents such as **acetone**, **methyl ethyl ketone**, **methyl isobutyl ketone**, **acetylacetone**, and methyl amyl ketone; and carboxylic acid **esters** such as ethyl lactate, methoxy **methyl propionate**, and ethoxy**ethyl propionate**. These solvents may be used either individually or in combination of two or more.

Concerning the preferred sulfonic acid, and preferred polycarboxylic acid, Suzuki, Hidenori teaches the following:

As examples of the organic acids, **acetic acid**, **propionic acid**, butanoic acid, pentanoic acid, hexanoic acid, heptanoic acid, octanoic acid, nonanoic acid, decanoic acid, **oxalic acid**, maleic acid, methylmalonic acid, **adipic acid**, sebacic acid, gallic acid, **butyric acid**, mellitic acid, arachidonic acid, shikimic acid, 2-ethylhexanoic acid, oleic acid, stearic acid, linolic acid, linoleic acid, salicylic acid, benzoic acid, p-aminobenzoic acid, p-**toluenesulfonic acid**, **benzenesulfonic acid**, **monochloroacetic acid**, **dichloroacetic acid**, **trichloroacetic acid**, **trifluoroacetic**

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**acid**, formic acid, malonic acid, sulfonic acid, phthalic acid, fumaric acid, **citric acid**, and **tartaric acid** can be given.

Concerning the hydrogen fluoride, Suzuki, Hidenori teaches the following:

As examples of the inorganic bases, hydrochloric acid, nitric acid, sulfuric acid, **hydrofluoric acid**, and phosphoric acid can be given.

Concerning the preferred monocarboxylic acid, Suzuki, Hidenori teaches the following:

As specific examples of the **acrylic acid** alkyl ester, alkyl **esters** having 1-6 carbon atoms such as **methyl acrylate**, **ethyl acrylate**, **n-propyl acrylate**, **isopropyl acrylate**, **n-butyl acrylate**, **isobutyl acrylate**, **pentyl acrylate**, and **hexyl acrylate** can be given.

As specific examples of the **methacrylic acid** alkyl ester, alkyl **esters** having 1-6 carbon atoms such as methyl methacrylate, ethyl methacrylate, n-propyl methacrylate, isopropyl methacrylate, n-butyl methacrylate, isobutyl methacrylate, butyl methacrylate, pentyl methacrylate, and hexyl methacrylate can be given. As **acrylic acid** alkoxyalkyl **esters**, **methoxymethyl acrylate**, **ethoxyethyl acrylate**, and the like can be given. As **methacrylic acid** alkoxyalkyl **esters**, **methoxymethyl methacrylate**, **ethoxyethyl methacrylate**, and the like can be given.

8. Claims 1-14, 35-66 are rejected under 35 U.S.C. 102(b) as being anticipated by Tanabe et al (US 20010038976).

Concerning the preferred hydrocarbons, preferred monocarboxylic acid, and preferred polycarboxylic acid, Tanabe, Masahito teaches the following:

[0015] Examples of the carboxyl group-containing organic compound and anhydride thereof include formic acid, **acetic acid**, **propionic acid**, **butyric acid**, **isobutyric acid**, **oxalic acid**, malonic acid, **succinic acid**, glutaric acid, maleic acid, fumaric acid, benzoic acid, phthalic acid, 1,2,3-**benzenetricarboxylic acid**, **glycolic acid**, **lactic acid**, malic acid, **citric acid**, acetic anhydride, phthalic anhydride, maleic anhydride, succinic anhydride and salicylic acid, with formic acid, phthalic acid, benzoic acid, phthalic anhydride and salicylic acid being preferred and phthalic acid, phthalic anhydride and salicylic acid being more preferred.

Concerning the claimed intended use, Tanabe, Masahito teaches the following:

[0024] The silicone wafer thus treated was then immersed successively in a remover solution (Stripper 106, manufactured by Tokyo Ohka Kogyo Co., Ltd.) heated to

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90.degree. C. for 10 minutes, in a rinsing solution (25.degree. C.) of each composition as specified in Table for 3 minutes and then in purified water for 3 minutes. After washing with running purified water and drying, the surface of the silicone wafer was observed to evaluate the degree of removing the removal solution and resist, and corrosion state. Furthermore, with respect to each rinsing solution, the generation of stain depending on the interval period between the immersion in the rinsing solution and the subsequent treatment, i.e., the immersion in purified water, was evaluated by observing the surfaces of the silicone wafers treated varying the interval period (5, 10, 15 and 30 seconds).

Concerning the preferred polyols, preferred ketones, preferred sulfonic acid, hydrogen fluoride, and preferred monohydric alcohols, Tanabe, Masahito teaches the following:

[0003] Known examples of the remover solution for removing the resist include an organic sulfonic acid-based remover solution containing an alkyl**benzenesulfonic acid** as the main component, an organic amine-based remover solution containing an organic amine such as mono**ethanolamine** as the main component, and a fluoric acid-based remover solution containing **hydrofluoric acid** as the main component. In the conventional method, a resist pattern layer is removed with such a remover solution and washing is then effected with purified water. However, the washing with purified water can not completely wash away the remover solution in a short time. Furthermore, if the washing time is prolonged, the corrosion of the conductive metallic film or insulating film

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is liable to occur. For this reason, the remover solution is removed with an organic solvent (i.e., rinsing treatment) prior to the washing with purified water. As the organic solvent useful for the rinsing treatment, use has been made of **methanol**, **ethanol**, **isopropyl alcohol**, **acetone**, **ethylene glycol**, etc. However, the remover solution cannot be sufficiently washed away, and it is difficult to remove the remover solution, particularly, in finely processed parts. Since fine processing techniques have recently made a rapid progress in the field of manufacturing semiconductors, it has been urgently required to develop a rinsing solution by which finely processed parts can be sufficiently washed without causing any corrosion of a conductive metallic film or an insulating film. The conventional rinsing solutions suffer from the following practical problem. That is to say, when the interval period between rinsing and the subsequent treatment is prolonged, stains due to insufficient rinsing (in other words, stains attributable to rinsing) would be frequently formed on the substrate surface. During processing the substrate, therefore; the margin (the range which does not cause any problems) of the transportation time is narrow and thus should be controlled in detail. In addition to the necessity for these functional improvements, attention should be paid to the cost and safety of various chemicals (a developer solution, a remover solution, a rinsing solution, etc.) which are used in the lithographic processing in manufacturing semiconductors.

Concerning the preferred esters, preferred nitrogen compounds, preferred glycol ethers, preferred amides, and preferred solvent types, Tanabe, Masahito teaches the following:

[0010] If needed, the rinsing solution may further contain other water soluble organic solvents. Examples of the water soluble organic solvents include **monohydric alcohols** such as methyl alcohol, ethyl alcohol and **isopropyl alcohol**; **ketones** such as **acetone**; sulfoxides such as dimethyl sulfoxide; sulfones such as dimethyl sulfone, diethyl sulfone, bis(2-hydroxyethyl) sulfone and tetramethylene sulfone; **amides** such as **N,N-dimethylformamide**, **N-methylformamide**, **N,N-dimethylacetamide**, **N-methylacetamide** and **N,N-diethylacetamide**; lactams such as **N-methyl-2-pyrrolidone**, **N-ethyl-2-pyrrolidone**, **N-propyl-2-pyrrolidone**, **N-hydroxymethyl-2-pyrrolidone** and **N-hydroxyethyl-2-pyrrolidone**; imidazolidinones such as 1,3-dimethyl-2-imidazolidinone, 1,3-diethyl-2-imidazolidinone and 1,3-diisopropyl-2-imidazolidinone; lactones such as **.gamma.-butyrolactone** and **.delta.-valerolactone**; and polyhydric alcohols and derivatives thereof such as **ethylene glycol**, **ethylene glycol monobutyl ether**, **ethylene glycol monomethyl ether acetate**, **ethylene glycol monoethyl ether acetate**, **diethylene glycol**, **diethylene glycol monomethyl ether**, **diethylene glycol monoethyl ether**, **diethylene glycol monobutyl ether** and **propylene glycol**. Among all, it is preferable to use methyl alcohol, ethyl alcohol, **isopropyl alcohol**, **ethylene glycol** or **propylene glycol**.

Concerning the compounds of claim 21, Tanabe, Masahito teaches the following:

7. The method of claim 6, wherein the organic amine compound is selected from the

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group consisting of hydroxyl**amines**, primary, secondary and tertiary aliphatic **amines**, alicyclic **amines**, aromatic **amines** and heterocyclic **amines**.

9. Claims 1-14, 35-66 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakayama (US 6,250,317).

Concerning the preferred esters, preferred hydrocarbons, preferred polyols, and preferred ketones, Nakayama, Yasuharu teaches the following:

11. A method according to claim 2, wherein said organic solvent is selected from the group consisting of **cyclohexanone**, **methyl isobutyl ketone**, **propylene glycol** monopropyl ether, **butyl acetate**, benzyl alcohol, **toluene** and **acetone**.

Concerning the preferred sulfonic acid, and preferred solvent types, Nakayama, Yasuharu teaches the following:

Suitable monobasic acids include aromatic monobasic acids such as **toluene sulfonic acid**, benzoic acid, methylbenzoic acid, and p-t-butylbenzoic acid; saturated or unsaturated fatty acids of 1-24 carbon atoms such as formic acid, **acetic acid**, **lactic acid**, **propionic acid**, **butyric acid**, **caproic acid**, **caprylic acid**, peralgonic acid, capric acid, undecanoic acid, lauric acid, myristic acid, palmitic acid, stearic acid,



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**cyclohexane** carboxylic acid, 9-decenoic acid, oleic acid, eleostearic acid, eraidic acid, brassylic acid, linolic acid, and linoleic acid; and hydroxyl carboxylic acids (oxy acids) such as dimethyl **propionic acid**, oxypivalic acid, 12-hydroxydodecanoic acid, 12-hydroxystearic acid, ricinolic acid, paraoxybenzoic acid, salicylic acid, and 4,4-bis (4'-hydroxyphenyl) pentanoic acid, for example. Lower alkyl **esters** and glycerides of these monobasic acids and such cyclic ester compounds as .epsilon.-caprolactone, .gamma.-valerolactone, and other lactones are also usable as monobasic acids.

Concerning the preferred ethers, preferred nitrogen compounds, preferred nitriles, preferred monohydric alcohols, preferred glycol ethers, and preferred halogen compounds, Nakayama, Yasuharu teaches the following:

Any desired organic solvent can be used. Suitable organic solvents (c) include hydrocarbon type solvents such as pentane, **hexane**, heptane, **octane**, **isooctane**, nonane, decane, dodecane, cyclopentane, methyl cyclopentane, **cyclohexane**, methyl **cyclohexane**, pentene, hexene, octene, decene, **benzene**, **toluene**, xylene, ethyl **benzene**, cumene, mesitylene, butyl **benzene**, diethyl **benzene**, cyclohexene, petroleum ether, petroleum benzine, kerosene, and turpentine oil; halogenated hydrocarbon type solvents such as dichloromethane, **chloroform**, carbon tetrachloride, ethyl chloride, dichloroethane, trichloroethane, tetrachloroethane, hexachloroethane, trichloroethylene, propyl chloride, dichloropropane, butyl chloride, chloro**benzene**,

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dichloro**benzene**, trichloro**benzene**, chloro**toluene**, and trichlorotrifluoroethane; alcohol type solvents such as **methanol**, **ethanol**, propanol, butanol, pentanol, pentyl alcohol, hexanol, heptanol, octanol, allyl alcohol, benzyl alcohol, **cyclohexanol**, methyl **cyclohexanol**, fusel oil, ethane diol, propane diol, butane diol, and **glycerine**; ether type solvents such as dipropyl ether, **dibutyl ether**, dihexyl ether, ethylvinyl ether, butylvinyl ether, **anisole**, propylene oxide, epoxy butane, **dioxane**, **tetrahydrofuran**, **tetrahydropyran**, dimethoxy ethane, 1,2-dibutoxy ethane, **diethylene glycol dimethyl ether**, **diethylene glycol** diethylene ether, acetal, **ethylene glycol monomethyl ether**, **propylene glycol** monomethyl ether, **propylene glycol** monoethyl ether, **propylene glycol** monopropyl ether, **ethylene glycol** monobutyl ether, **propylene glycol** monobutyl ether, 3-methyl-3-methoxy propane, **diethylene glycol**, and **triethylene glycol**; ketone type solvents such as **acetone**, methylethyl ketone, pentanone, hexanone, methylisobutyl ketone, heptanone, acetonyl **acetone**, dioxobutyl ketone, isophorone, **cyclohexanone**, methyl **cyclohexanone**, and acetophenone; ester type solvents such as methyl formate, ethyl formate, propyl formate, butyl formate, **methyl acetate**, **ethyl acetate**, propyl acetate, **butyl acetate**, **pentyl acetate**, 3-methoxy**butyl acetate**, cyclohexyl acetate, **methyl propionate**, benzyl acetate, **butyl propionate**, butyric **esters**, diethyl malonate, **ethylene glycol** monoacetate, **ethylene glycol esters**, **diethylene glycol** monoacetate, diethyl carbonate, ethylene carbonate, boric **esters**, and phosphoric **esters**; nitrogen compound type solvents such as nitromethane, nitropropane, nitro**benzene**, **acetonitrile**, triethyl amine, diethyl amine, butyl amine, aniline, N,N-dimethyl aniline, pyridine, N-methyl formamide, N,N-dimethyl

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formamide, acetamide, N,N-dimethyl-acetamide, 2-pyrrolidone, **N-methyl pyrrolidone**, .epsilon.-caprolactam, and morpholine; and sulfur type solvents such as carbon disulfide, dimethyl sulfoxide, and sulforan, for example.

Concerning the preferred polycarboxylic acid, Nakayama, Yasuharu teaches the following:

Concrete examples of the dibasic acid include aromatic dicarboxylic acids and anhydrides thereof such as terephthalic acid, isophthalic acid, phthalic acid, naphthalene dicarboxylic acid, 4,4'-biphenyl dicarboxylic acid, and diphenyl methane-4,4'-dicarboxylic acid; alicyclic dicarboxylic acids and anhydrides thereof such as hexahydroisophthalic acid, hexahydroterephthalic acid, hexahydrophthalic acid, and tetrahydrophthalic acid; aliphatic dicarboxylic acids and anhydrides thereof such as **adipic acid**, sebacic acid, suberic acid, **succinic acid**, glutaric acid, maleic acid, chloromaleic acid, fumaric acid, dodecanoic diacid, pimelic acid, azelaic acid, itaconic acid, citraconic acid, and dimeric acid; and lower alkyl esters such as methyl esters and ethyl esters of these dicarboxylic acids.

10. Claims 1-14, 35-66 are rejected under 35 U.S.C. 102(b) as being anticipated by Tanabe et al (US 5,905,063)

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Concerning the compounds of claim 21, claimed intended use, hydrogen fluoride, Tanabe, Masahito teaches the following:

The composition of the present invention has an almost neutral pH value of 5 to 8. This pH range may be attained by using component (a) which is almost neutral. The proportion of **hydrofluoric acid** to a metal-free base to be added thereto so as to attain a neutral pH value varies depending on the kind of the base, and cannot hence be shown unconditionally. For example, in the case of **ammonia** water, component (a) having a pH value in the desired range can be prepared by mixing **hydrofluoric acid** with **ammonia** water having the same molar concentration in a proportion of 1/1 by volume. In the case of ethanolamine, component (a) having a pH value in the desired range can be prepared by mixing 1,000 ml of 1 mol/l hydrofluoric acid with 1 mol of monoethanolamine. Use of component (a) having a pH value in the above-specified range enables the composition of the present invention to be handled safely while maintaining the removability of modified films and inhibiting the composition from corroding a metal film on a substrate or peripheral devices including a remover feeder. Furthermore, a low hydrogen fluoride content of component (a) eliminates the necessity of troublesome exhaust and wastewater treatments, which are necessary in resist removing processes where hydrogen fluoride generates.

Concerning the preferred esters, preferred nitrogen compounds, preferred glycol ethers, preferred amides, and preferred solvent types, Tanabe, Masahito teaches the following:

Any organic solvent may be used as component (b) in the present invention, as long as it is miscible with components (a), (c), and (d). Water-soluble organic solvents used in conventional organic amine-based remover solution compositions may be used.

Examples of the water-soluble organic solvents include sulfoxides (e.g., dimethyl sulfoxide), sulfones (e.g., dimethyl sulfone, diethyl sulfone, bis(2-hydroxyethyl) sulfone, tetramethylene sulfone), **amides** (e.g., **N,N-dimethylformamide**, **N-methylformamide**, **N,N-dimethylacetamide**, **N-methylacetamide**, N,N-diethylacetamide), lactams (e.g., **N-methyl-2-pyrrolidone**, N-ethyl-2-pyrrolidone, N-propyl-2-pyrrolidone, N-hydroxymethyl-2-pyrrolidone, N-hydroxyethyl-2-pyrrolidone), imidazolidinones (e.g., 1,3-dimethyl-2-imidazolidinone, 1,3-diethyl-2-imidazolidinone, 1,3-diisopropyl-2-imidazolidinone), lactones (e.g., **.gamma.-butyrolactone**, .delta.-valerolactone), and polyhydric alcohols (e.g., **ethylene glycol**, **ethylene glycol** inonomethyl ether, **ethylene glycol monoethyl ether**, **ethylene glycol** monobutyl ether, **ethylene glycol**, monomethyl ether acetate, **ethylene glycol monoethyl ether** acetate, diethylene glycol, **diethylene glycol monomethyl ether**, **diethylene glycol monoethyl ether**, diethylene glycol monobutyl ether); and derivatives thereof. Among these, preferred are dimethyl sulfoxide, **N,N-dimethylformamide**, **N,N-dimethylacetamide**, **N-methyl-2-pyrrolidone**, 1,3-dimethyl-2-imidazolidinone, ethylene glycol, and **diethylene glycol** monobutyl ether, because these solvents bring about the removability of modified resist films. In particular, use of a water-soluble organic solvent comprising at least 10% by weight (wt %) **ethylene glycol** as component (b) is preferred in that the composition of

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the present invention containing this component (b) is highly inhibited from corroding a metal deposition substrate in the removing of a holed resist pattern. In this case, **ethylene glycol** alone may be used as component (b) because the higher the **ethylene glycol** content, the higher the anticorrosive effect. A mixture of 40 to 60 wt % of **ethylene glycol** and 60 to 40 wt % of dimethyl sulfoxide is also advantageous.

Concerning the preferred preferred monocarboxylic acid, and preferred polycarboxylic acid, Tanabe, Masahito teaches the following:

Examples of the carboxyl group-containing organic compounds and anhydrides thereof include formic acid, **acetic acid**, **propionic acid**, **butyric acid**, **isobutyric acid**, **oxalic acid**, malonic acid, **succinic acid**, glutaric acid, maleic acid, fumaric acid, benzoic acid, phthalic acid, 1,2,3-benzenetricarboxylic acid, **glycolic acid**, **lactic acid**, malic acid, **citric acid**, acetic anhydride, phthalic anhydride, maleic anhydride, succinic anhydride, and salicylic acid. Among these, preferred are formic acid, phthalic acid, benzoic acid, phthalic anhydride, and salicylic acid, and especially preferred are phthalic acid, phthalic anhydride, and salicylic acid.

Concerning the preferred sulfonic acid, Tanabe, Masahito teaches the following:

Conventionally used resist remover solutions for removing resist include organic sulfonic acid-based remover solutions containing an **alkylbenzenesulfonic acid** as an

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essential component and organic amine-based remover solutions containing an organic amine, e.g., monoethanolamine, as an essential component. However, the organic sulfonic acid-based remover solutions have a drawback that since they contain a highly toxic organic solvent, such as a phenol compound or chlorobenzene, not only use of the remover solutions results in poor working efficiency and poses an environmental problem, but also the remover solutions are apt to corrode electroconductive metal films on substrates and the like. In contrast, the organic amine-based remover solutions are less toxic than the organic sulfonic acid-based remover solutions, do not require a troublesome wastewater treatment of the organic sulfonic acid-based remover solutions, are effective in removing modified films resulting from treatments such as dry etching, ashing, ion implantation, and the like, and are highly inhibited from corroding substrates having provided thereon Al, Cu, and the like. Because of these advantages, the organic amine-based remover solutions are currently used extensively.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregory E. Webb whose telephone number is 571-272-1325. The examiner can normally be reached on 9:00-17:30 (m-f).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harold Pyon can be reached on 571-272-1498. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Gregory E. Webb/  
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